CLAIMS

1. A multimode speech decoding apparatus comprising:

first decoding means for decoding at least one type

5 of parameter indicative of vocal tract information contained in a speech signal;

second decoding means for being capable of decoding said at least one type of parameter indicative of vocal tract information contained in the speech signal with

10 a plurality of decoding modes;

mode determining means for determining a mode based on a dynamic characteristic of a specific parameter decoded in said first decoding means; and

synthesis means for decoding the speech signal using

15 a plurality of types of parameter information decoded in said first decoding means and said second decoding means,

wherein said mode determining means comprises:

means for calculating an evolution of a quantized

20 LSP parameter between frames;

means for calculating an average quantized LSP parameter on a frame where the quantized LSP parameter is stationary; and

means for calculating a distance between the average

25 quantized LSP parameter and a current quantized LSP parameter, and detecting a predetermined amount of a difference in a particular order between the quantized

LSP parameter and the average quantized LSP parameter.

2.   The multimode speech decoding apparatus, further comprising:

stationary noise generating means for outputting

5   an average LSP parameter of a noise region, while generating a stationary noise by driving, using a random signal acquired from a random codebook, a synthesis filter constructed with an LPC parameter obtained from the average LSP parameter, when the mode determined in said

10   mode determining section is a stationary noise mode.

3.   A mode determining apparatus comprising:

first decoding means for decoding at least one type of parameter indicative of vocal tract information contained in a speech signal;

15   second decoding means for being capable of decoding said at least one type of parameter indicative of vocal tract information contained in the speech signal with a plurality of decoding modes; and

mode determining means for determining a mode based

20   on a dynamic characteristic of a specific parameter decoded in said first decoding means.

4.   The mode determining apparatus according to claim 3, further comprising:

means for calculating an evolution of a quantized

25   LSP parameter between frames;

means for calculating an average quantized LSP parameter on a frame where the quantized LSP parameter

is stationary; and

means for calculating a distance between the average quantized LSP parameter and a current quantized LSP parameter, and detecting a predetermined amount of a

5   difference in a particular order between the quantized LSP parameter and the average quantized LSP parameter.

5.   A stationary noise generating apparatus comprising:

excitation generating means for generating a noise excitation; and

10   excitation; and

an LSP synthesis filter representative of a spectral envelope of a stationary noise,

wherein said apparatus uses mode information determined in the mode determining apparatus according

15   to claim 4.

6.   The stationary noise generating apparatus according to claim 5, wherein said excitation generating means generates a noise excitation vector from a vector selected randomly from a random codebook.

20   7.   A multimode speech coding apparatus comprising:

first coding means for coding at least one type of parameter indicative of vocal tract information contained in a speech signal;

25   second coding means for being capable of coding said at least one type of parameter indicative of vocal tract information contained in the speech signal with a

plurality of modes;

mode determining means for determining a mode of said second coding means based on a dynamic characteristic of a specific parameter coded in said first coding means;

5 and

synthesis means for synthesizing an input speech signal using a plurality of types of parameter information coded in said first coding means and said second coding means,

10 wherein said mode determining means comprises:

means for calculating an evolution of a quantized LSP parameter between frames;

means for calculating an average quantized LSP parameter on a frame where the quantized LSP parameter 15 is stationary; and

means for calculating a distance between the average quantized LSP parameter and a current quantized LSP parameter, and detecting a predetermined amount of difference in a particular order between the quantized 20 LSP parameter and the average quantized LSP parameter.

8. The speech coding apparatus according to claim 7, further comprising:

search range determining means for setting a pitch period search range to a range that does not include a 25 last subframe when the mode is a stationary noise mode.

9. The speech coding apparatus according to claim 7,

further comprising:

pitch synchronization gain control means for controlling a pitch synchronization gain corresponding to the mode in determining a pitch period using a codebook.

5   10.   The speech coding apparatus according to claim 9, wherein said pitch synchronization gain control means controls the gain for each codebook.

11.   The speech coding apparatus according to claim 9, wherein when the mode is a stationary noise mode,
10   said pitch synchronization gain control means decreases the pitch synchronization gain.

12.   The speech coding apparatus according to claim 7, further comprising:

auto-correlation function calculating means for
15   calculating an auto-correlation function of a residual signal of an input speech;

weighting processing means for performing weighting on a result of the auto-correlation function corresponding to the mode; and

20   selecting means for selecting a pitch candidate using a result of the weighted auto-correlation function.